COMMERCIAL MICROWAVE OVEN

SERVICE MANUAL

EM-S1000□
EM-E1000□

CAUTION

Before servicing the oven, read the “Safety Precautions” section on page 2 of this manual.

SPECIFICATIONS

MODEL EM-S1000□	
Power Source:	230V AC, 50Hz□
Max. Output Power:	1000 watts□
Cavity Size:	0.8 cu-ft□
Overrall Dimensions:	520(W)x412(D)x296(H)mm□
Net Weight:	17 kgs□
□	
Model EM-E1000□	
Power Source:	230V AC, 50Hz□
Max. Output Power:	1000 watts□
Cavity Size:	1.0 cu-ft□
Overall Dimensions:	520(W) x 412(D)x296(H)mm□
Net Weight:	17 kgs□

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Product Code No.

EM-S1000 ECO 1-437-602-04□
EM-S1000 EUK 1-437-602-05 □
EM-E1000

NOTICE

This service information is intended for use by a service technician who is familiar with proper and safe procedures to be followed when repairing any electrical or gas appliance and who is equipped with proper tools and testing devices. Repairs covered in this publication and made by uninformed persons can result in hazards developing due to improper assembly or adjustment. While making such repairs, persons not having the proper background may subject themselves to the risk of injury or electrical shock which can be serious or even fatal.

A. If the oven is operative prior to servicing, a microwave emission check should be performed prior to servicing the oven.
B. Inform the manufacturer, importer, or assembler of any certified oven unit found to have a microwave emission level in excess of 5 mW/cm2. Repair any unit found to have excessive emission levels at no cost to the owner (see 21 CFR 1004.2) and attempt to ascertain the cause of the excessive leakage. The owner of the unit should be instructed not to use the unit until the oven has been brought into compliance.
C. If the oven operates with the door open: 1) tell the user not to operate the oven and 2) contact the manufacturer and/or importer and CDRH immediately.

D. Remember to connect the monitor switch after replacement and to check interlock/monitor continuity.

IMPORTANT NOTE TO THE CONSUMER

The manufacturer will not be responsible for injury or property damage arising from service performed by anyone other than authorized Service Centers. If you perform service on your own products, you must assume responsibility for personal injury or property damage which may result.

PRECAUTIONS TO BE OBSERVED BEFORE AND DURING SERVICING TO AVOID POSSIBLE EXPOSURE TO EXCESSIVE MICROWAVE ENERGY

(a) Do not operate or allow the oven to be operated with the door open.

(b) Make the following safety checks on all ovens to be serviced before activating the magnetron or other microwave source and make repairs as necessary: (1) Interlock operation, (2) proper door closing, (3) seal and sealing surfaces (arcing, wear, and other damage), (4) damage to or loosening of hinges and latches, (5) evidence of dropping or abuse.

(c) Before turning on microwave power for any service test or inspection within the microwave generating compartments, check the magnetron, waveguide or transmission line, and cavity for proper alignment, integrity, and connections.

d) Any defective or misadjusted components in the interlock, monitor, door seal, and microwave generation and transmission systems shall be repaired, replaced, or adjusted by procedures described in this manual before the oven is released to the owner.

(e) A microwave leakage check to verify compliance with the Federal performance standard should be performed on each oven prior to release to the owner.

INSTALLATION INSTRUCTIONS

IMPORTANT: BEFORE THE UNIT IS INSTALLED, INSPECT THE OVEN AND DETERMINE IF ANY OF THE FOLLOWING DAMAGE CONDITIONS EXIST.

1. The door does not close firmly against the door support because the door is warped or the hinge is damaged.
2. Either the door seals or the trim is damaged.
3. If there is any visible damage to the oven.

If any of the above conditions exist, DO NOT OPERATE THE OVEN. Call your local authorized service representative.

If none of the above conditions exist, proceed with properly installing the oven.

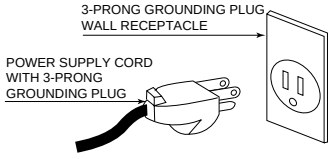
A minimum clearance of 3” on both sides and 1” on top and rear must be observed. This will allow proper internal ventilation of the unit. Also, do not remove the legs because of the possibility of restricting the ventilation.

WARNING
ELECTRICAL GROUNDING INSTRUCTIONS

This appliance is equipped with a three-prong grounding plug for your protection against shock hazard and must be plugged directly into a properly grounded receptacle.

Use a properly polarized and grounded three hole receptacle as is required by NATIONAL ELECTRICAL CODES on all new construction.

NOTE: APPLIANCE MUST BE GROUNDED



For the safety of the user, it is required that all major appliances requiring electricity for operation be electrically grounded in accordance with the National Electrical Code ANSI C1-1981.

Check all code rules and regulations for connecting the appliance to be certain the installation conforms with all local, municipal and state codes as well as local utility regulations.

Where a two-prong wall receptacle is encountered, it is the personal responsibility of the user to contact a qualified electrician and have it replaced with a properly grounded three-prong wall receptacle in accordance with the National Electrical Codes.

DO NOT use a two-prong adapter, since proper grounding is not assured even if the ground wire or metal tab is connected to the outlet box.

The use of an extension cord is not recommended. However,if it is necessary to use an extension cord, it must be a type s, with 3 number 14 wires and have a 3 prong grounded plug. The extension cord should not drape over a countertop where it can be pulled on or tripped over accidentally.

Under no circumstances should the rounded ground prong be removed from the plug.
Failure to comply with the above could result in a serious shock hazard .

GENERAL INFORMATION

IMPORTANT: BEFORE PROCEEDING, THE FOLLOWING INFORMATION MUST BE CAREFULLY READ TO **AVOID POSSIBLE EXPOSURE TO MICROWAVE RADIATION.**

Before servicing the oven, unplug the oven, remove the cabinet and take a continuity reading of the interlock switches to assure they are operating properly.

Refer to the Component Test Section in this service manual.

Also, it is very important to insure that the door seals are not damaged. If a microwave leakage instrument is available, check the oven for any possible microwave leakage.

Do not operate the oven if the following conditions exist.

1. The door does not close firmly against the door support because of the door being warped or the hinge is damaged.
2. The door seals or door trim are damaged.
3. If there is any visible damage to the oven.

Do not operate the oven if the front frame of the oven is dirty or if the interlocks are loose. Microwave leakage may be present if these conditions exist.

Do not operate the oven if:

1. any door gaskets or trim surrounding the oven door or control panel are missing.
2. the waveguide and oven cavity are not intact.
3. the door does not close properly.

Avoid operating the oven if known components in the interlock, oven door or microwave genertng transmission assembly are defective. They must be replaced.

After the above precautions have been taken, proceed with normal repair procedures.
Remember that high voltage is present, so use caution to avoid electrical shock.

MICROWAVE RADIATION TEST

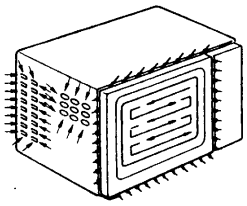
NOTE: A MICROWAVE LEAKAGE CHECK SHOULD BE PERFORMED AFTER ANY REPAIRS OR ADJUSTMENTS HAVE BEEN MADE ON THE DOOR, FRONT FRAME AND/OR INTERLOCK SWITCHES,

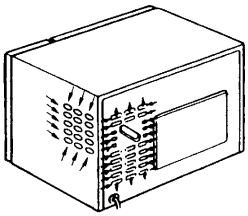
IMPORTANT: IF THE READING IS OVER 2 mW/cm2, REFER TO THE DOOR AND INTERLOCK ADJUSTMENTS SECTION IN THIS MANUAL. THE DOOR IS DESIGNED FOR LEAKAGE OF LESS THAN 1 mW/cm^2, ADJUSTMENTS SHOULD BE MADE TO BRING ALL READINGS TO BELOW 1 mW/cm^2.

The microwave leakage measurement equipment manufacturers presently acceptable are NARDA, SIMPSON and HOLADAY. More information on these units can be obtained from the respective equipment manufacturers.

TO PERFORM MICROWAVE LEAKAGE CHECK:

1. Fill 275 milliliters or 9 ounces of tap water in a 2 cup measuring cup.
2. Place the container in the center of the oven cavity on the glass tray.
3. Set power control for microwave "Cook" (high) or 100% operation. Set timer for 3 minutes.
4. Close the door securely and start the oven.
5. Perform the proper adjustment and operations check with the microwave leakage meter (refer to the operation instructions with the meter). Check the oven by moving the probe, starting at the top right-hand side of the door, clockwise no faster than one inch per second, back to the starting position. Also, a check over the entire visual screen must be made.





Probe Speed: One inch per second (max.)
IMPORTANT: MICROWAVE LEAKAGE CHECK MUST BE PERFORMED ON THE REAR VENTS AND SIDE VENTS.

NOTE: THE METER PROBE MUST BE HELD APPROXIMATELY TWO INCHES FROM THE POINT OF MEASUREMENT. THIS IS ACCOMPLISHED BY THE USE OF A TWO-INCH (5 cm) PLASTIC SPACER THAT IS SUPPLIED WITH THE METER. IT IS NORMALLY ATTACHED TO THE PROBE.

6. The maximum allowable microwave leakage level is 5mW/cm2 by government standard.

IMPORTANT: IF THE READING IS OVER 2 mW/cm2, REFER TO THE DOOR AND INTERLOCK ADJUSTMENTS SECTION IN THIS MANUAL. THE DOOR IS DESIGNED FOR LEAKAGE OF LESS THAN 1 mW/cm^2, ADJUSTMENTS SHOULD BE MADE TO BRING ALL READINGS TO BELOW 1 mW/cm^2.

MAGNETRON FAILURE MODES

LOSS OF VACUUM
This is a case where the tube has had the vacuum envelope destroyed and air has entered the tube. This will cause internal arcing. With continued use, the transformer will eventually fail and the circuit fuse will blow.

OPERATION FAULTS
OPEN FILAMENTS
A magnetron with an open filament will produce no heating power.
An open filament lead or "dead" filament transformer will give the same indication as an open filament in the magnetron. This possibility should be eliminated before the magnetron is considered open.

INTERNAL PLATE CATHODE SHORT
A shorted magnetron will give the same indications as the loss of vacuum.

MODING
Moding occurs when the magnetron momentarily operates at a different frequency and a higher voltage than designed. Moding results in low heating power. Moding is usually caused by the cathode losing emission characteristics.

LOW POWER
Low emission will result in low cooking power. Food will require a longer than normal cooking time. It can be detected by a lower than normal water temperature rise.

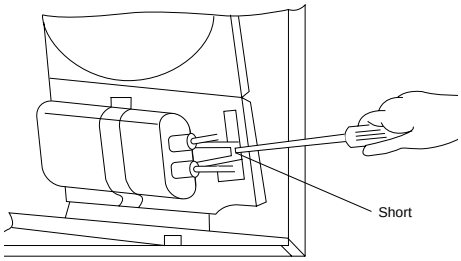
LOW EMISSION
Caused by "wearout" of the emission characteristics of the directly heated cathode. The tube current does not get high enough to cause the tube to oscillate with normal line voltage. Everything will appear normal, but the tube will not heat.

SAFETY PRECAUTIONS FOR DISASSEMBLY AND REPAIR

-Cautions to be observed when troubleshooting.
Unlike many other appliances, the microwave oven is a high-voltage, high-current piece of equipment. It is completely safe during normal operation. However, carelessness in servicing the oven can result in an electric shock or possible danger from a short circuit.
You are asked to observe the following precautions carefully.

(1) Always remove the power plug from the outlet before servicing.
(2) Use an insulated screwdriver and wear rubber gloves when servicing the high voltage side.
(3) Discharge the high voltage capacitor before touching any oven components or wiring.

1. **Check the grounding.**
   Do not operate on a 2-wire extension cord. The microwave oven is designed to be used when grounded. It is imperative, therefore, to make sure it is grounded properly before beginning repair work.



2. **Warning about the electric charge in the high voltage capacitor.**
   For about 60 seconds after the operation stops, an electric charge remains in the high voltage capacitor. When replacing or checking parts, create a short between oven chassis and the negative high terminal of the high voltage capacitor, by using a properly insulated screwdriver to discharge it.
(4) When the 10 Amp. fuse is blown out due to the operation of the monitor switch, replace primary and secondary interlock switches, monitor switch and relay 2.
(5) After repair or replacement of parts, make sure that the screws are properly tightened, and all electrical connections are tightened.
(6) Do not operate without cabinet.

DESCRIPTION & FUNCTION OF COMPONENTS

FAN MOTOR
The fan motor drives a blower fan which draws cool air through the back of the oven. This cool air is directed through the air ducts surrounding the magnetron tube to cool the magnetron. Some of the air is then exhausted directly through the bottom vents.
However, a portion of this air is channeled through the cavity to remove the steam and vapors given off from heating food.

OVEN LIGHT
The oven light illuminates the interior of the cavity so the food can be visually examined through the door.

POWER TRANSFORMER
The purpose of the power transformer is to provide the filament voltage for heating the magnetron filaments as well as to produce the high voltage needed for magnetron tube operation.
During a cook cycle, the ,230 Volts AC applied to the primary winding is converted to approximately 3.22 Volts AC on the filament winding. The same 230 Volts AC primary input is converted to approximately 2070 Volts AC on the high voltage secondary winding of the power transformer.
CAUTIONS: AFTER REMOVING THE CABINET, DISCHARGE THE CAPACITOR BY PLACING AN **INSULATED** SCREWDRIVER ACROSS THE TERMINALS.

PRIMARY (UPPER) INTERLOCK SWITCH
The primary protective switch (interlock) is activated by the latch when the door is closed. The switch, in the open position when the door is open, interrupts the current to the magnetron. Closing the door will close the interlock switch and normal operations can be continued.

SECONDARY (LOWER) INTERLOCK SWITCH
The secondary protective interlock switch is located behind the front control panel and is activated when the door is closed. When the door is open, this switch will interrupt the circuit.

MONITOR (MIDDLE) INTERLOCK SWITCH

This interlock switch disables the control panel if the door is open or the catch is out of adjustment or the primary interlock switch fails.
If for some reason the primary switch and secondary switch stick in the closed position and the door were to be opened, the circuit would be shorted through the normally closed safety switch. This would blow the fuse.

If there appears to be an interlock switch problem, but the fuse is not blowing, refer to the Component Test Procedure Section in this service manual.

NOTE:IF THE INTERLOCK SWITCHES ARE REPLACED, THE CATCH MUST BE ADJUSTED. SEE DOOR AND INTERLOCK ADJUSTMENTS SECTION FOR PROPER ADJUSTMENT PROCEDURE. DEFECTIVE SWITCHES SHOULD BE DESTROYED TO PREVENT POSSIBLE FUTURE USE.
IMPORTANT: IF AT ANY TIME THE OVEN FUSE BLOWS DUE TO AN OVEN FAULT, OR THE CIRCUIT BREAKER TRIPS AFTER BEING RESET ONE TIME WITH THE HOUSE CIRCUIT UNLOADED EXCEPT FOR THE OVEN, THE INTERLOCK SWITCHES MUST BE REPLACED AS A GROUP. THIS IS BECAUSE THE SHORT CIRCUIT CURRENTS WILL HAVE DAMAGED THESE IMPORTANT SWITCHES.

MAGNETRON THERMAL PROTECTOR

The magnetron thermal protector located on the magnetron is designed to prevent an overheated condition in the tube due to fan failure, obstructed air ducts, etc.
Under normal operating conditions, the thermal protector remains closed. However, If abnormally high temperatures within the magnetron approach a critical level, the thermal protector will interrupt the circuit to the magnetron. When the magnetron has cooled to a safe operating temperature, the thermal protector closes and a cook (or defrost) cycle can be resumed.

HALF-WAVE VOLTAGE DOUBLER CIRCUIT

The half-wave rectification circuit consists of a diode package and a single capacitor. The 2070 Volts AC from the high voltage secondary winding is rectified to approximately 3680 Volts DC (peak voltage) needed for magnetron operation.

1. Diode - a diode is a solid state device that allows current flow in one direction, but prevents current flow in the opposite direction.
2. Capacitor - a capacitor is able to store electric energy, as well as pass AC and block DC current.

WATER TEMPERATURE RISE CHECK

The following procedure should be followed when low power is suspected in the oven but all other operations, including cooking light operation, appear normal.
Power output of the magnetron can be measured by performing a water temperature rise check. This test will require a quart glass cup and an accurate mercury thermometer or thermocouple-type temperature tester. For accurate results the following procedure must be followed carefully.

1. Fill a measuring cup with one quart of tap water and measure temperature of the water with a thermometer or thermocouple tester. Stir the temperature probe through the water until the temperature stabilizes. Record the temperature of the water and remove the temperature probe.
2. Place the measuring cup in the oven and put the oven into the cook (high) cycle for exactly two (2) minutes. Allow the water to heat.
3. Remove cup from the oven and again measure temperature making sure to stir the temperature probe through the water until maximum temperature is recorded.
4. Subtract the cold water temperature from the hot water temperature. The result should be 25°F±4°F, or between 21°F to 29°F rise in temperature. If the water temperature is accurately measured and tested for the required time period, the test result will indicate if the magnetron tube has low power output (low rise in water temperature) which would extend cooking time, or high power output (high rise in water temperature) which would reduce cooking time.

Because cooking times can be adjusted to compensate for power output, the magnetron tube assembly should be replaced only if the water temperature rise test indicates a power output well beyond the normal limits. This test is only accurate if the power supply line voltage is 120 Volts while the oven is operating.

ALTERNATE TEST-METRIC

Use same procedure as in preceding paragraphs except as noted.

1. Use 1000 ML water.
2. Timer for two minutes.
3. Same
4. Water temperature will be between 8°F to 12°F higher.

ELECTRICAL OPERATION

By closing the door, the primary and secondary interlock switches close and monitor switch opens. The closed switches allow line voltage to flow through the 20 amp fuse to interlock to magnetron thermal switch. At this point, line voltage splits and power is applied to primary side of high voltage transformer, oven cavity light, fan motor, and timer.
To complete the circuit, two things must happen to energize the above Components. The timer must be set, which will close timer contacts, and the door must be closed, which activates the interlock switches. At this time, line voltage to neutral is applied across high voltage primary, timer, oven light, and fan.
The 230 Volt AC input to the primary winding of the power transformer is converted to approximately 2070 Volts AC output from the high voltage secondary winding. At the same time, the filament secondary winding of the power transformer provides 3.32 Volts AC to heat the magnetron filaments.
The 2070 Volts AC output from the power transformer high voltage secondary winding is sent to a half-wave doubling circuit comprised of a single diode and capacitor where approximately 4140 Volts DC (peak voltage) is provided to the magnetron tube.
The negative 4140 Volts DC applied to the cathode of the magnetron tube causes the magnetron to oscillate and produce the 2450 MHz cooking frequency.
The microwave energy produced by the magnetron tube is channeled through a waveguide into the cavity past the diffuser and finally into a cavity where the load is placed to be heated. When the timer has completed the selected cooking time, the timer switch opens. The circuits are open to the light, timer, fan motor, and power transformer, and the microwave energy is no longer produced. Five beeps signal the end of the cook cycle.

DOOR & INTERLOCK ADJUSTMENTS

DOOR ADJUSTMENTS

The door adjustment on all microwave ovens is very important to prevent any excessive leakage. The microwave leakage levels should be checked after all door, interlock switches and associated repairs are made. See the Microwave Radiation Test Section in this manual for proper testing procedures.

The following door adjustments must be followed.

LATCH & CATCH ASSEMBLY ADJUSTMENTS

CAUTION: AFTER REMOVING THE CABINET, DISCHARGE THE CAPACITOR BY PLACING AN INSULATED SCREWDRIVER ACROSS THE TERMINALS.
To make proper latch and catch assembly adjustment:

1. Disconnect the power to the unit, remove the cabinet and discharge the capacitor by placing an insulated screwdriver across the terminals.
2. Open the door.
3. Loosen the screws that secure the plastic interlock bracket until the assembly can be moved freely back and forth.
4. Hold the door closed securely.
5. Move the plastic catch toward the door until it stops and door is latched. Next, move the catch toward the back panel making sure it is snug against door latch. Check by opening and closing the door. Using an ohmmeter, place the leads of the meter across the terminals of the monitor switch. As the door is opened, your meter should show a short, as the door is closed it should show an open circuit.

6. Tighten and secure the plastic bracket with screws.
7. To be totally sure that switches are functioning properly, see Primary, Secondary Interlock Switch and Monitor Switch Test Procedures.

DO NOT ATTEMPT TO ADJUST INTERLOCK SWITCHES WITH OVEN ENERGIZED. IF THIS WARNING IS NOT OBSERVED, HIGH LEVELS OF MICROWAVE LEAKAGE MAY BE PRESENT.

NOTE: IF THE INTERLOCKS ARE REPLACED, THEY MUST BE ADJUSTED. SEE INTERLOCK ADJUSTMENTS SECTION FOR PROPER ADJUSTMENT PROCEDURE.

PRIMARY (UPPER) INTERLOCK SWITCH TEST

1. Disconnect power to the unit. Remove the cabinet and discharge the capacitor.
2. With the ohmmeter set on the RX1 scale, take continuity readings as noted below.

A) Condition: Door open
Test: Ohmmeter check from LC to MSC indicates open circuit.

B) Condition: Door closed
Test: Ohmmeter check from LC to MSC indicates short circuit.

3. If the switch does not operate as described above, replace all the switches and relay2. Repeat the above tests.

SECONDARY (LOWER) INTERLOCK SWITCH TEST

1. Disconnect power to the unit, remove the cabinet and discharge the capacitor.
2. With the ohmmeter set on the RX1 scale, take continuity readings as noted below.

A) Condition: 1)Door open
Test: Ohmmeter check from SISC to SISNO indicates open circuit.

B) Condition: Door closed
Test: Ohmmeter check from SISC to SISNO indicates short circuit.

3. If the switch does not operate as described above, replace all the switches and relay2. Repeat the above tests.

WARNING:FOR CONTINUED PROTECTION AGAINST EXCESSIVE RADIATION EMISSION REPLACE ONLY WITH PARTS AS DESCRIBED IN THE PARTS LIST

CAUTION: WHEN REPLACING THESE SWITCHES, USE ONLY FACTORY REPLACEMENT PARTS. REPLACING WITH ANY OTHER PART WILL VOID THE WARRANTY AND MAY CAUSE INJURY TO THE USER.

MONITOR (MIDDLE) INTERLOCK SAFETY SWITCH TEST

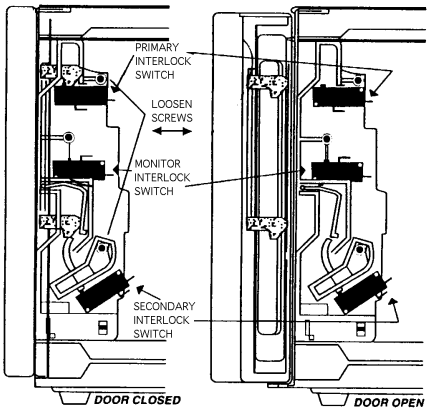
1. Disconnect power to the unit. Remove the cabinet and discharge the capacitor.
2. With the ohmmeter set on the RX1 scale, take continuity readings as noted below.

A) Condition: Door open
Test: Ohmmeter check from MSC to MSNC indicates open circuit.

B) Condition: Door closed
Test: Ohmmeter check from MSC to MSNC indicates short circuit.

3. If the switch does not operate as described above, replace all the switches and relay2. Repeat the above tests.

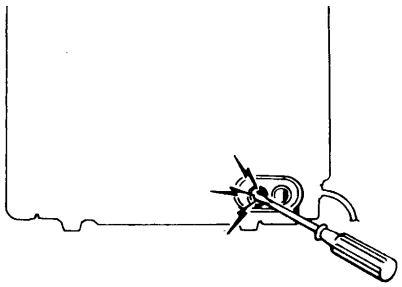
COMPONENT TEST PROCEDURES



HIGH VOLTAGE COMPONENT OPERATIONAL TEST

In this section we have tried to lay these tests out in a logical sequence so that you can isolate any suspected high voltage problem.

1. Unplug oven from its power source.
2. After removing the cabinet discharge the capacitor by shorting the two capacitor terminals together with an insulated screwdriver.
3. Visually check the high voltage wiring for proper connections. Refer to wiring diagram for proper wiring sequence.



CAUTIONS: HIGH VOLTAGES ARE PRESENT DURING THE COOK (HIGH) CYCLE, SO EXTREME CAUTION SHOULD BE OBSERVED. WHEN TESTS ARE COMPLETE, ALWAYS UNPLUG THE OVEN FROM ITS POWER SOURCE AND DISCHARGE THE CAPACITOR.

NOTE: DO NOT TOUCH ANY OVEN COMPONENTS OR WIRING DURING OVEN OPERATION.

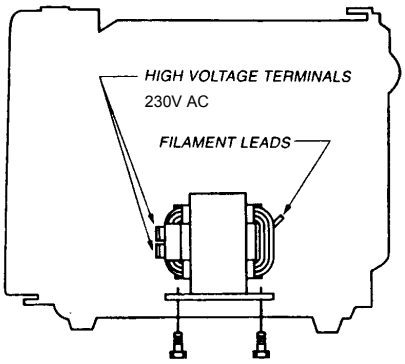
POWER TRANSFORMER TESTS

TRANSFORMER INPUT VOLTAGE CHECK

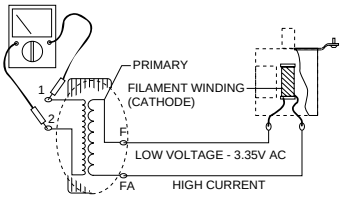
An operational test can be made in order to determine whether or not primary power is being applied to the transformer.

CAUTION: APPROXIMATELY 1840V AC IS PRESENT AT THE **HIGH VOLTAGE TERMINAL** OF POWER TRANSFORMER DURING COOK CYCLE. OBSERVE CAUTION AT ALL TIMES.

1. With the oven power cord unplugged and cabinet removed, discharge the capacitor with an insulated screwdriver.
2. With alligator clips, connect a meter capable of measuring at least 230V AC, across the input terminals to the transformer.



3. Plug oven in and set for regular cook operation. If all primary circuits are functioning properly, 230V should be applied and measured across transformer.



FILAMENT VOLTAGE CHECK

An operational test can be made in order to determine the amount of filament voltage produced by the power transformer.

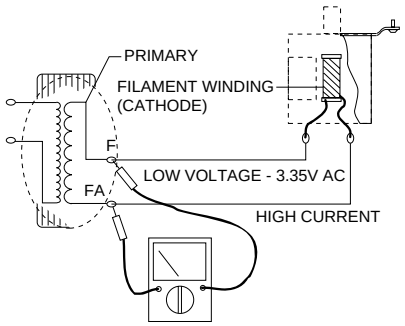
CAUTION: APPROXIMATELY 2070 VOLTS AC ARE PRESENT AT THE HIGH VOLTAGE TERMINAL OF THE POWER TRANSFORMER DURING COOK (HIGH CYCLE). OBSERVE CAUTION AT ALL TIMES.

1. With oven power cord unplugged and cabinet removed, discharge the capacitor with an insulated screwdriver.
2. Remove the high voltage lead that connects the capacitor to the high voltage terminals.

NOTE: DURING TEST OPERATION, KEEP METER, HANDS, ETC., WELL AWAY FROM THE HIGH VOLTAGE TERMINALS OF THE POWER TRANSFORMER.

3. With alligator clips, connect a meter capable of measuring up to 10 Volts AC across the magnetron filament terminals.
4. Apply power to the oven and put the oven into cook (high) cycle to get a filament voltage reading. A normal indication should be approximately 2.8 to 3.75 Volts AC. Unplug the oven before disconnecting the meter leads.
5. If a normal 2.8 to 3.75 Volts AC reading was indicated on the meter, go to step 6.
6. If the input voltage is normal, but no filament voltage is present, replace the power transformer.

7. If filament voltage is normal, unplug the power cord, discharge the capacitor, reinstall the high voltage lead and refer to the Magnetron Filament Test.



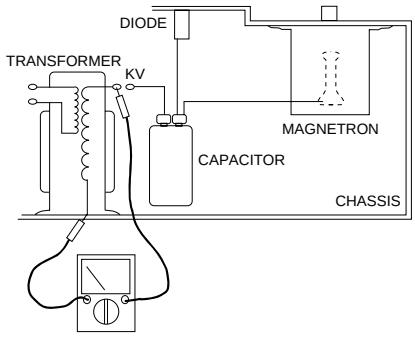
HIGH VOLTAGE WINDING CONTINUITY CHECK - POWER TRANSFORMER

One side of the power transformer high voltage secondary winding is connected to oven chassis ground. The other end of the high voltage secondary has one terminal with a red lead.
Since approximately 2070 Volts AC are present at the high voltage secondary terminal during a cook (high) cycle, it is not recommended that the high voltage measurements be attempted. Normally, a continuity check of high voltage secondary winding will be sufficient to determine the condition of the secondary winding.

1. With oven unplugged, discharge the capacitor and remove the high voltage lead from the power transformer high voltage secondary terminal.
2. With an ohmmeter set on the RX1 scale, measure the resistance between the high voltage terminal of the power transformer and oven chassis ground. The reading should indicate around 80 ohms.
3. If extremely low resistance is indicated, or if extremely high or infinite resistance is indicated with the continuity test, replace the power transformer. A shorted transformer will blow the fuse.

MAGNETRON FILAMENT TEST

Disconnect the high voltage leads from the

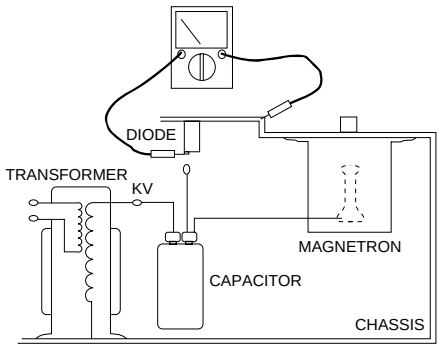


magnetron filament terminals. Measure the resistance across the two magnetron filament terminals with the ohmmeter set on RX1. If a normal resistance of less than 1 ohm between magnetron terminals is indicated on the meter, make a Power Transformer Test.
If high resistance or infinite resistance is indicated between the magnetron terminals, replace the magnetron assembly.

DIODE CHECK

1. Set volt ohmmeter to read ohms using RX10,000 or higher scale.
2. Check resistance between the diode terminals. Reverse leads and check again. There should be considerable difference (minimum of 1/2 of scale) between the two readings, approximately a 10 to 1 ratio. If reversing the leads does not change the reading, replace the diode.

The diode may be checked in the unit, but one lead must be removed. Some high impedance vacuum tube (V.T.M.) or solid state (F.E.T.) meters may show an acceptable diode as defective. These meters will normally show high ohms (open) in both lead positions.
NOTE: METERS WITH LESS THAN A 6 OR

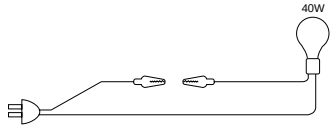


9 VOLT BATTERY ARE USUALLY NOT ADEQUATE FOR CHECKING THE FRONT-TO-BACK RESISTANCE OF THE DIODE. THE METER SHOULD BE CHECKED WITH A DIODE KNOWN TO BE GOOD BEFORE JUDGING A DIODE TO BE DEFECTIVE BECAUSE OF AN INFINITE RESISTANCE READING IN BOTH DIRECTIONS.

If continuity is indicated in both directions, or if an infinite resistance is read in both directions, the diode is probably defective and should be replaced.
If the diode check is normal, go to Magnetron Check.

CHECKING H.V. DIODES - ALTERNATIVE METHOD

Many times the diode you check as open is probably good. We have found that many of you are checking them out on the wrong scale of your meter, or that your meter is physically not able to check the H.V. diodes we use in our microwave ovens.
We are, therefore, providing an alternate test method for checking diodes in which you do not need a meter. All you need is a jumper cord and a 40 watt light bulb.
A simple test set up like this will easily check H.V. diodes.



The test procedure is:
1. Connect an alligator clip to each terminal of diode.
2. Plug in cord.
a. If the bulb doesn't light, the diode is open.
b. If bulb lights normally both ways when leads are reversed, diode is shorted.
c. A normal diode will produce a dim light when the leads are placed on the diode in one direction.
Before making any checks get a known good diode and make a test for comparison.

CAPACITOR TESTS

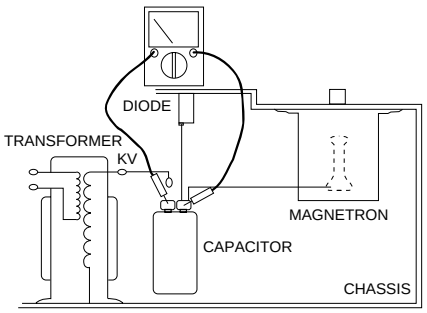
If the capacitor is open, no high voltage is available to the magnetron. A shorted capacitor normally causes high line current, which should trip the wall circuit breaker or blow the line fuse.

An ohmmeter can be used to check for a shorted or open capacitor.

1. With an ohmmeter set on the highest scale, measure the resistance between the two capacitor terminals. The meter should indicate continuity between the terminals for a short time and should indicate an open circuit once the capacitor is charged. Reversing the meter leads should give the same indication.
2. If the ohmmeter indicates continuity between the capacitor terminals at all times, or if no meter deflection occurs at all, the capacitor should be replaced.

NOTE: THE OHMMETER SHOULD BE SET ON THE HIGHEST RESISTANCE SCALE WHEN MAKING A CAPACITOR CHECK. CAPACITORS WITH INTERNAL RESISTOR CAN SHOW A RESISTANCE AS LOW AS TWO (2) MEGOHMS.

MAGNETRON THERMAL PROTECTOR



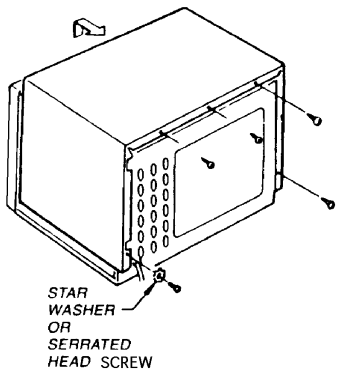
TEST

Unless an overheat condition exists, a continuity check across the thermal protector contacts should indicate a closed circuit. The thermal protector opens at approximately 150-C (302-F) if used.

DISASSEMBLY & REPLACEMENT OF PARTS

CABINET REMOVAL

1. Disconnect the power cord from the wall outlet.
2. Remove the screws from the rear edges of the case. When replacing screws, make sure at least one screw has a star washer or serrated head on it for proper grounding.
3. Slide the cabinet back about one inch.
4. Lift the cabinet from the unit.



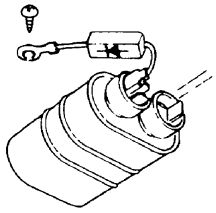
NOTE: ALL DISASSEMBLY AND REPLACEMENT OF PARTS BEGINS WITH THE CABINET REMOVED.

CAUTION: UNPLUG THE OVEN AND DISCHARGE THE CAPACITOR BEFORE REMOVING ANY OF THE COMPONENTS.

IMPORTANT: DO NOT OPERATE THE OVEN IF:
- THE DOOR DOES NOT FIT PROPERLY.
- THE WAVEGUIDE AND OVEN ARE NOT INTACT.
- THE R-F GASKET IS MISSING. (THE R-F GASKET IS LOCATED AROUND THE DOME OF THE MAGNETRON TUBE TO PREVENT ANY LEAKAGE BETWEEN THE MAGNETRON TUBE AND THE WAVEGUIDE.)

HIGH VOLTAGE DIODE REMOVAL

1 . Discharge the capacitor by shorting across each terminal.
2. Remove one lead from capacitor.
3. Remove screw which holds other lead with offset screwdriver.



4. Replace wire for wire, if replacement is used. (Observe proper diode polarity.) The arrow on diode should point to the capacitor bracket.
5. To reinstall, reverse above procedure.

FAN ASSEMBLY REMOVAL

1 . Disconnect the two lead wires from the fan motor.
2. Remove fan shroud by removing shroud mounting screws.
3. Remove the two motor assembly mounting screws secured to the back cabinet.
4. The entire fan assembly can then be removed.
5. Remove the fan blade by pulling the fan blade from the motor shaft.
6. To reassemble and install, reverse the above procedure. Be sure to glue the fan blade onto the motor shaft.

CAPACITOR REMOVAL

1. Discharge the capacitor.
2. Remove the screw(s) from capacitor mounting bracket and swing it out of the way.
3. If replacement capacitor is used, replace wire for wire.
4. To reassemble, reverse the above procedure. It is important for high voltage clearance that the capacitor be firmly seated.

For proper capacitor testing procedure, see Component Test Procedures.

POWER TRANSFORMER REMOVAL

1. Unplug the power cord, remove the outer case and discharge the capacitor.
2. Disconnect all the leads to the transformer, primary, secondary and filament. Remove the support bracket at the top of the transformer.
3. Remove mounting screws from the underside of the chassis that fastens the transformer and lift the transformer out.
4. To reinstall, reverse the above procedure. It is important that screws be tight since they are the ground return for the high voltage winding.

REMOVAL OF THE OVEN LIGHT SOCKET/ LIGHT BULB

1. Unplug the power cord. Remove the outer cabinet and discharge the capacitor.
2. Remove the socket/bulb mounting screw.
3. Remove socket/bulb assembly. Remove wires from socket/ bulb terminals.

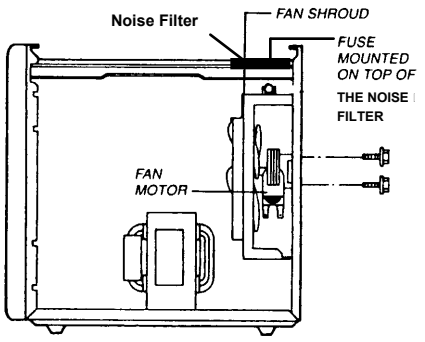
NOTE: BULB IS PART OF SOCKET AND MUST BE REPLACED AS AN ASSEMBLY.

4. Replace wires on terminals of new socket and replace socket/bulb by reinstalling the mounting screw.

REPLACING THE FUSE

IMPORTANT: IF THE 10 AMP FUSE BLOWS, REFER TO THE TESTING PROCEDURE. DO NOT REPLACE IT UNTIL THE PROBLEM IS CORRECTED. ALSO, IF AT ANY TIME THE OVEN FUSE BLOWS DUE TO AN OVEN FAULT, OR THE CIRCUIT BREAKER TRIPS AFTER BEING RESET ONCE WITH THE HOUSE CIRCUIT UNLOADED (EXCEPT FOR THE OVEN), THE INTERLOCK SWITCHES MUST BE REPLACED AS A GROUP. THIS IS BECAUSE THE SHORT CIRCUIT WILL HAVE DAMAGED THESE IMPORTANT SWITCHES. SEE INTERLOCK SWITCH REMOVAL.

NOTE: IF INTERLOCKS HAVE BEEN REPLACED, IT IS VERY IMPORTANT TO MAKE A MICROWAVE LEAKAGE CHECK OF THE DOOR. SEE THE MICROWAVE LEAKAGE SECTION IN THIS MANUAL.



1. Unplug the power cord, remove the outer cabinet and discharge the capacitor.
2. Remove the fuse.
3. A blown fuse can be diagnosed with an ohmmeter.
4. Replace with a 10 Amp fuse.

NOTE: USE ONLY A NORMAL-BLOW 20 AMP TUBULAR CERAMIC FUSE SUCH AS THE LITTELFUSE 3140120 20A. DO NOT USE A SLOW BLOW FUSE.

INTERLOCK AND MONITOR SWITCH REMOVAL

If for any reason one of the interlock switches fail, all three must be replaced as a group.

1. Unplug the power cord, remove the outer cabinet and discharge the capacitor. Open the door.
2. Remove the air guide from the front side of the magnetron. The air guide is secured to the right side of the oven cavity with a 2 piece plastic pin.
3. The switches are all mounted on a single plastic bracket and are held in position with plastic tabs.
4. Remove screws holding plastic switch bracket to oven chassis.
5. After the switch bracket has been removed, the tabs can be seen. By applying slight pressure, the switch will release from the switch bracket.
6. Remove switches and replace wire for wire. Reverse above to reinstall.

CAUTION: WHEN REPLACING THE INTERLOCK SWITCHES, BE SURE THE MOUNTING TABS ARE NOT BROKEN, BENT OR OTHERWISE DEFICIENT IN THEIR ABILITY TO PROPERLY RETAIN THE INTERLOCK SWITCHES.

IMPORTANT: DO NOT OPERATE THE OVEN UNTIL THE INTERLOCKS ARE PROPERLY ADJUSTED. SEE DOOR AND INTERLOCK ADJUSTMENTS SECTIONS.

IMPORTANT: THE INTERLOCK SWITCHES MUST MEET STRICT FEDERAL REQUIREMENTS FOR RELIABLE OPERATION. IT IS EXTREMELY IMPORTANT THAT ANY QUESTIONABLE SWITCHES BE REPLACED WITH THE EXACT SAME TYPE OBTAINED FROM THE FACTORY SERVICE PARTS DIVISION. DEFECTIVE SWITCHES MUST BE RENDERED INOPERATIVE BY TWISTING ONE OF THE TERMINALS.

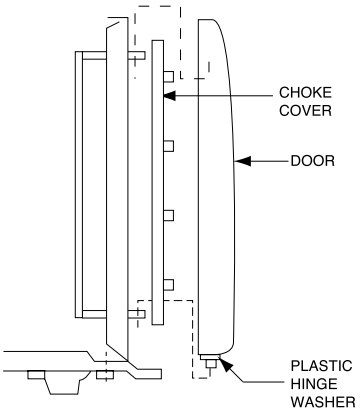
TURNTABLE OR STIRRER MOTOR AND DRIVE REMOVAL

1. Unplug the power cord, remove the outer cabinet and discharge the capacitor.
2. Remove the glass tray and plastic turntable assembly from the oven cavity. (MODEL EM-E1100)
3. Turn the oven upside down. Remove the motor access cover. Upon initial service, the cover, which is an integral part of the bottom plate, must be cut free. Use wire cutters to cut the 4 integral tabs. Be careful of sharp edges.

4. Remove the 2 screws securing the motor. Withdraw the motor and disconnect the 2 lead wires from the motor.
5. Reverse the above procedure to reinstall new parts., note the following:
6. Replace the motor access cover by engaging the long tab into the slot provided on the bottom plate and secure the other end with an M4 self tapping screw.

DOOR ASSEMBLY REMOVAL

1. Disconnect power from the unit, remove the cabinet and discharge the capacitor.
2. Open the door and carefully remove the choke cover. Remove door.
3. Reverse the above procedure to install the new door assembly.
4. The microwave sealing strips located on the door must not be removed or damaged.



IMPORTANT: AFTER THE DOOR HAS BEEN REPLACED, THE INTERLOCKS MUST BE ADJUSTED PROPERLY. SEE INTERLOCK ADJUSTMENTS SECTION BEFORE OPERATING THE OVEN.

NOTE: AFTER REPAIRS HAVE BEEN MADE, IT IS VERY IMPORTANT TO MAKE A MICROWAVE LEAKAGE CHECK OF THE DOOR. SEE THE MICROWAVE RADIATION TEST SECTION IN THIS MANUAL.

CONTROL PANEL ASSEMBLY REMOVAL AND REPLACEMENT

1. Unplug the power cord. remove the cabinet and discharge the capacitor. Open the door.
2. Remove screw securing control panel to front of oven chassis.
3. To reassemble, reverse the above process. If provided, be sure to reinstall the green ground wire under screw.

ELECTRONIC CONTROLLER ASSEMBLY REMOVAL

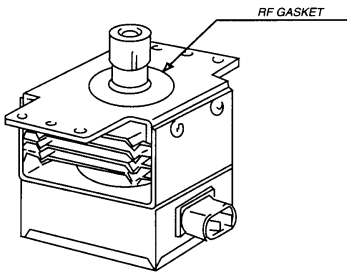
1. Disconnect power from the unit. Remove the cabinet and discharge the capacitor.
2. Remove screw at top that holds the control panel to the oven chassis.
3. Controller can be replaced by removing screws through rear of control panel and replacing with new control, wire for wire. Reverse above steps to reinstall.
4. **NOTE:** The only replaceable parts on the controller are the complete PCB assembly and the keyboard assembly. No other parts are available.
5. When replacing a keyboard assembly, be sure to attach it to the PCB panel.

THERMAL PROTECTOR REMOVAL

1. Unplug the power cord, remove the outer cabinet and discharge the capacitor.
2. Disconnect the connectors from the thermal protector terminals.
3. Remove the thermal protector mounting screw.
4. Remove the thermal protector.
5. Reverse procedure to replace.

MAGNETRON ASSEMBLY REMOVAL

1. Unplug the power cord, remove the cabinet and discharge the capacitor.
2. Remove the air guides and thermal protector from the magnetron.



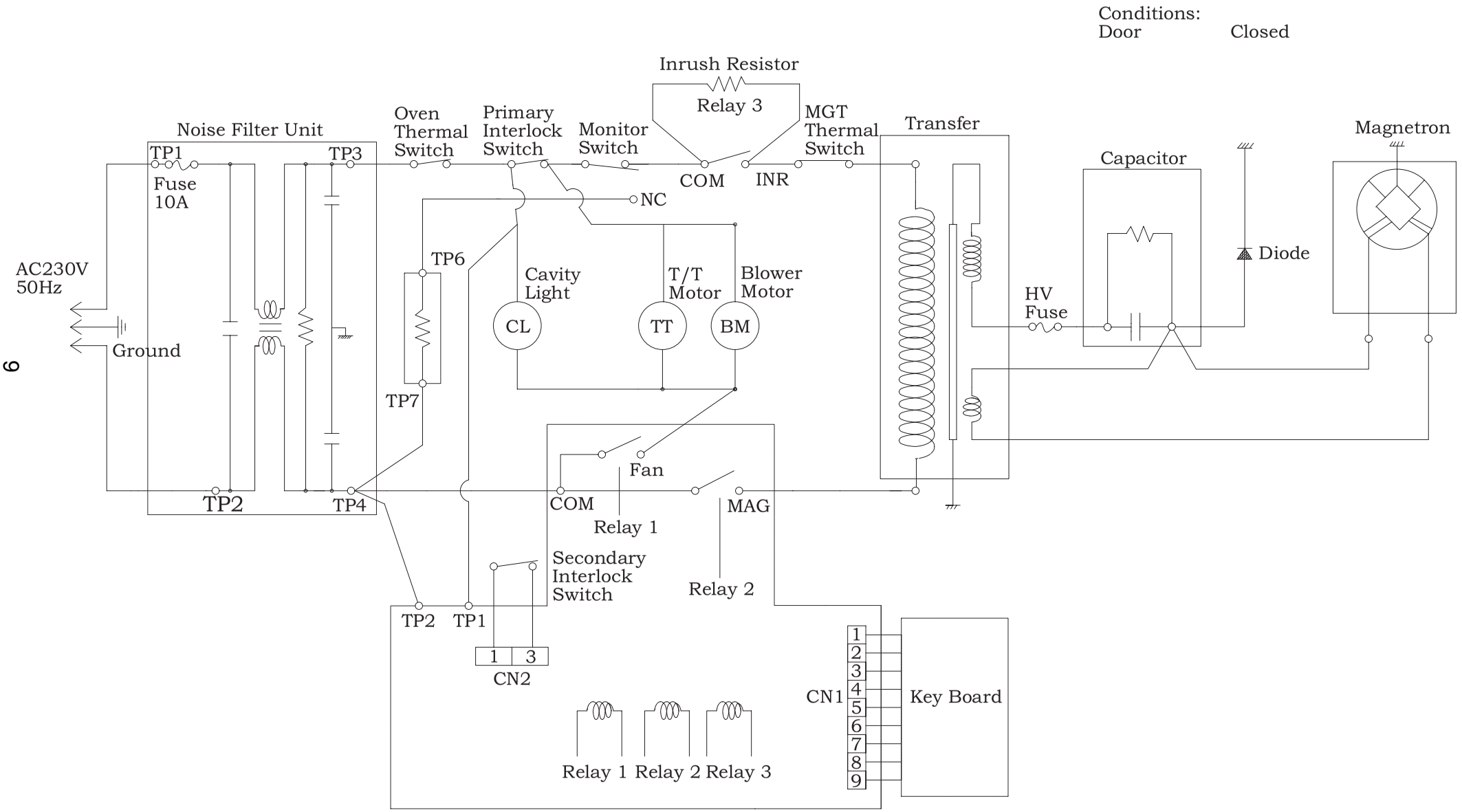
3. Remove the four magnetron mounting screws from the side of oven cavity.
4. Disconnect wire leads from magnetron and replace on new magnetron, wire for wire.
5. Reverse the above procedure to reinstall new magnetron and reassemble.

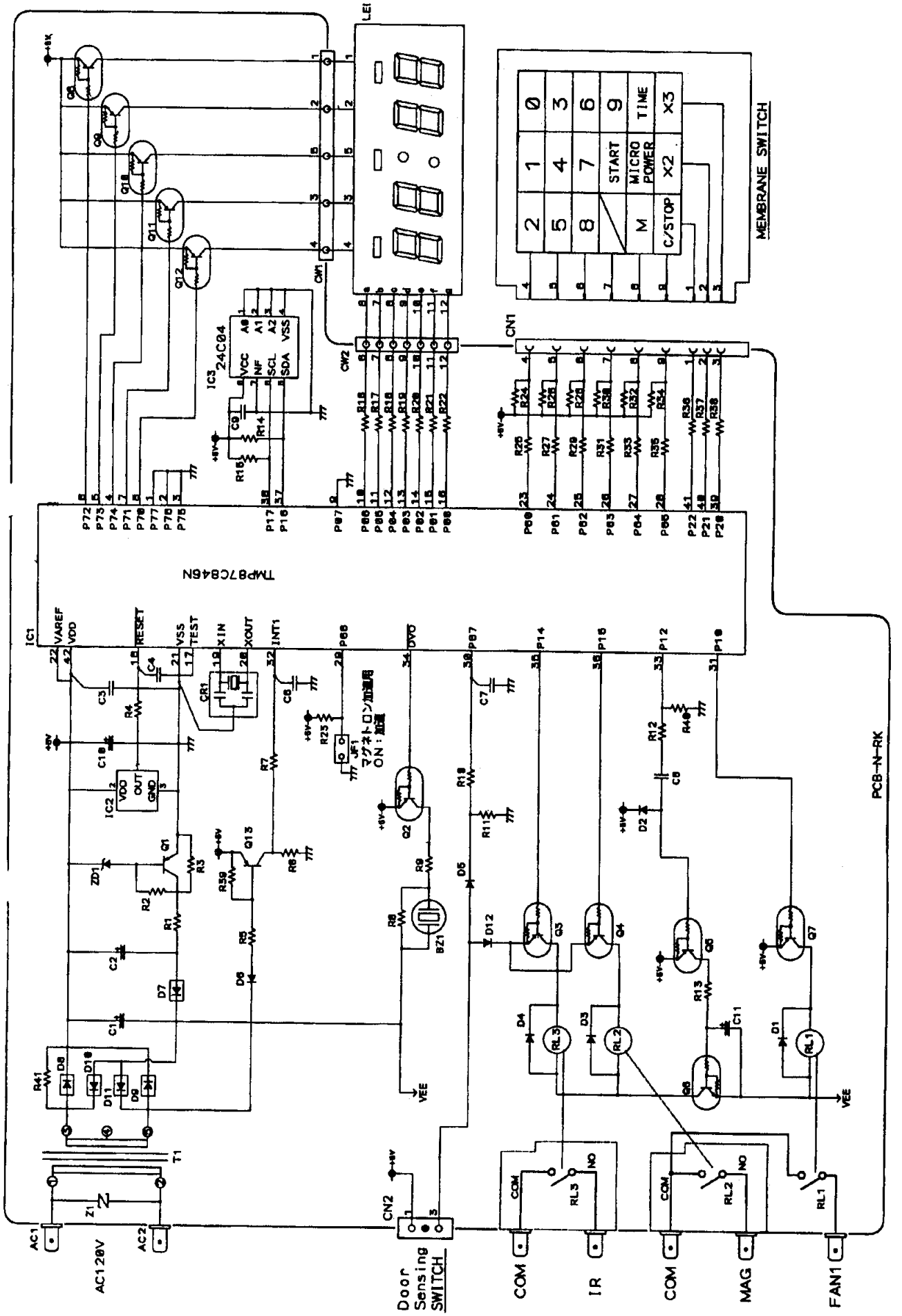
NOTE: DO NOT LOSE SCREWS, THEY ARE M4 METRIC.

I**MPORTANT:** DO NOT OPERATE THE OVEN WITH THE MAGNETRON DISASSEMBLED FROM THE WAVEGUIDE.

IMPORTANT: MAKE SURE WIRE GASKET IS PRESENT BEFORE INSTALLING MAGNETRON.

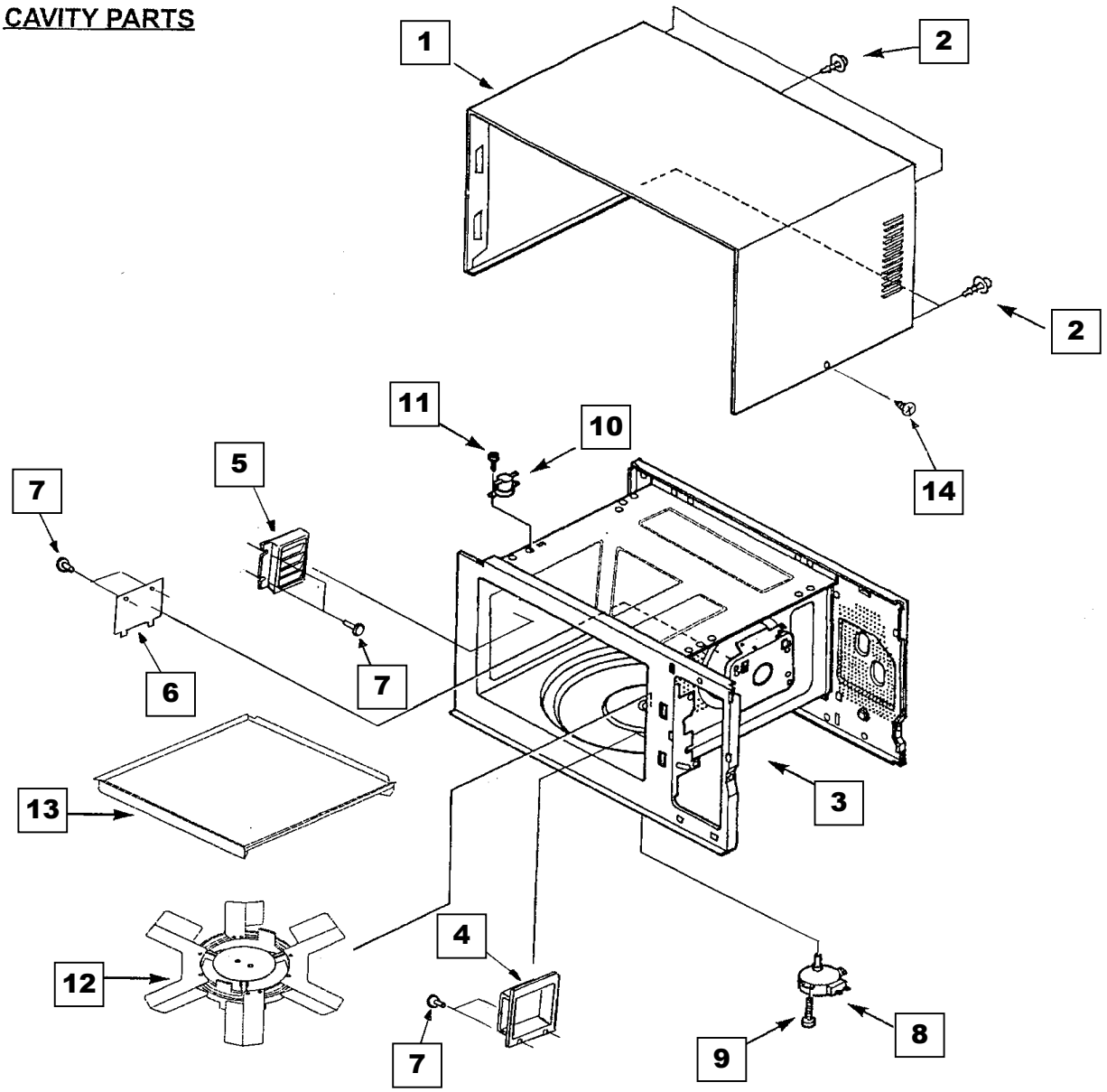
Wiring Diagram




MEMBRANE SWITCH
0
3
6
9
TIME
X3
1
4
7
START
MICRO POWER
X2
2
5
8
M
C/STOP
TMP87C846N
IC1
IC2
IC3
24C04
CN1
CN2
CW1
CW2
LE1
PCB-N-RK
AC1
AC2
AC120V
T1
Z1
Door Sensing SWITCH
COM
IR
COM
MAG
FAN1
RL1
RL2
RL3
VEE

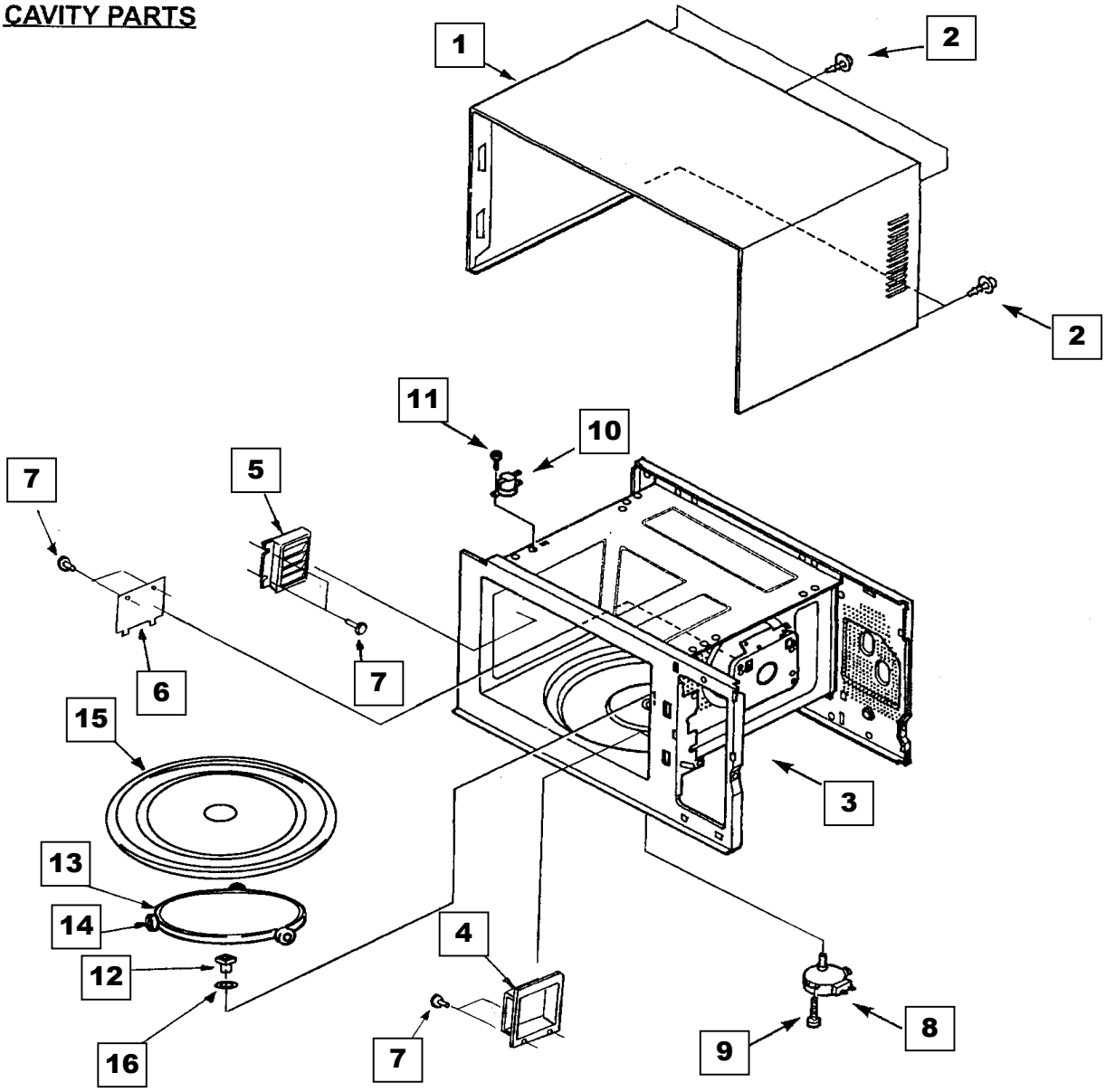
EM-S1000

CAVITY PARTS

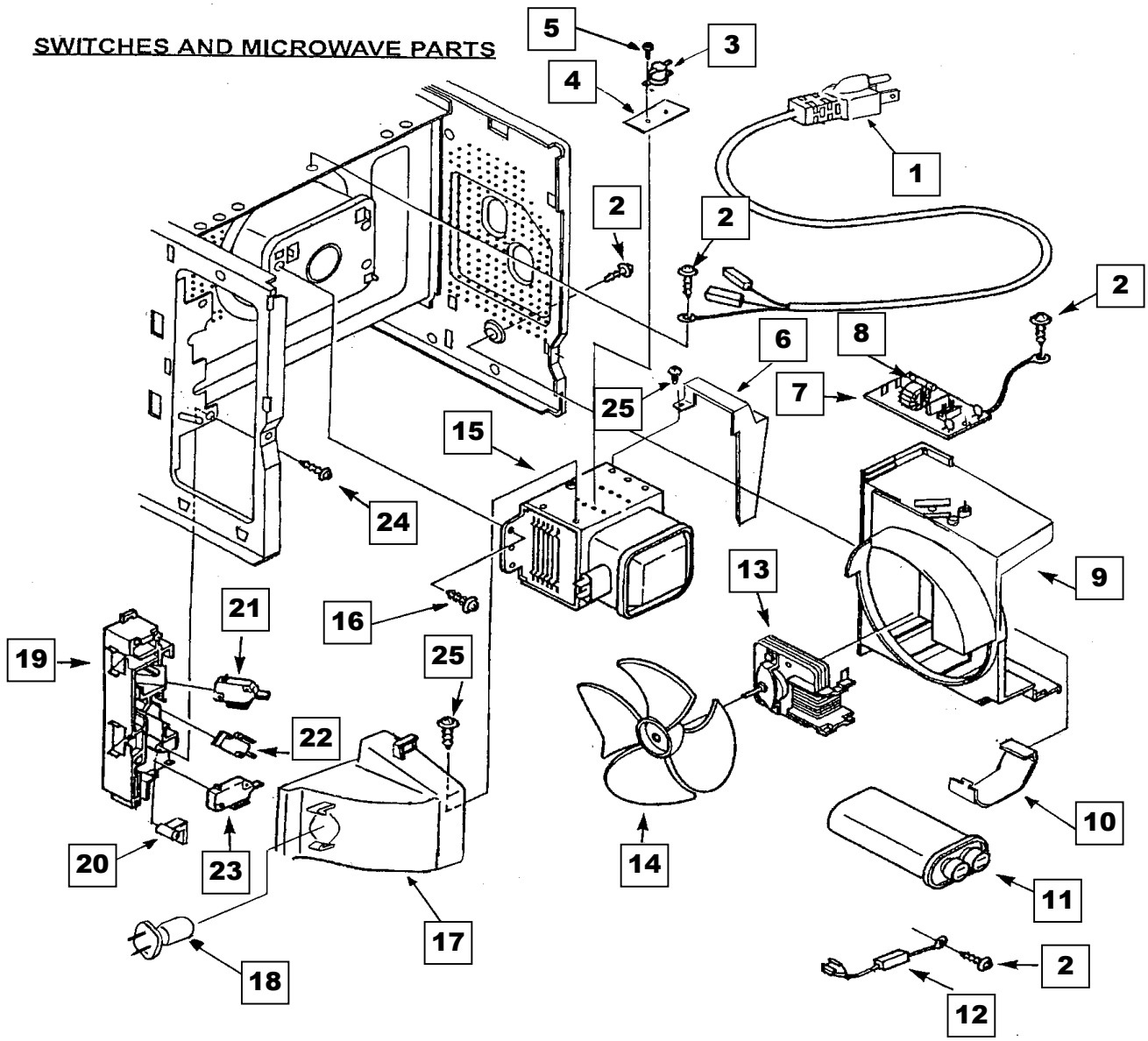


EM-E1000

CAVITY PARTS

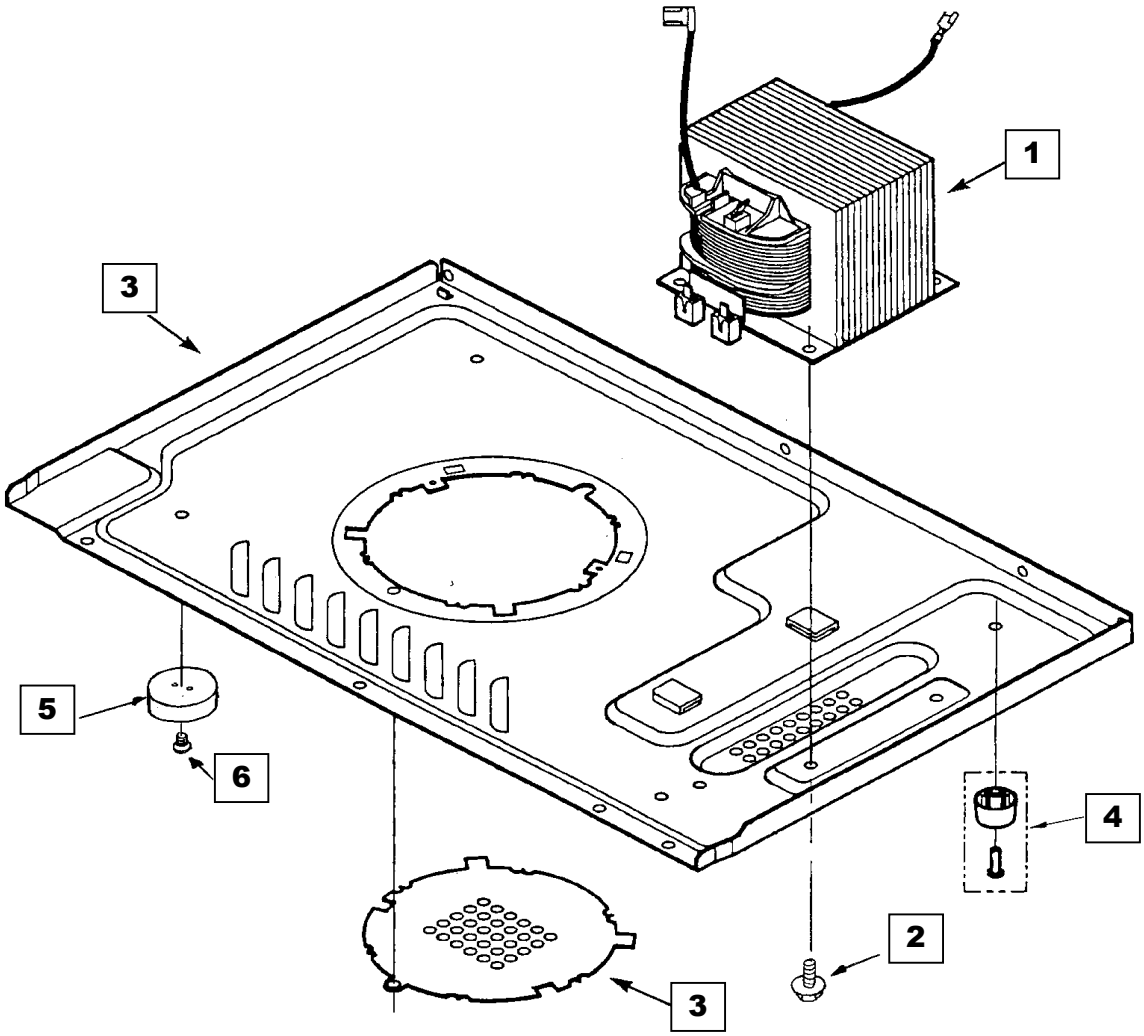


EM-S1000 & EM-E1000

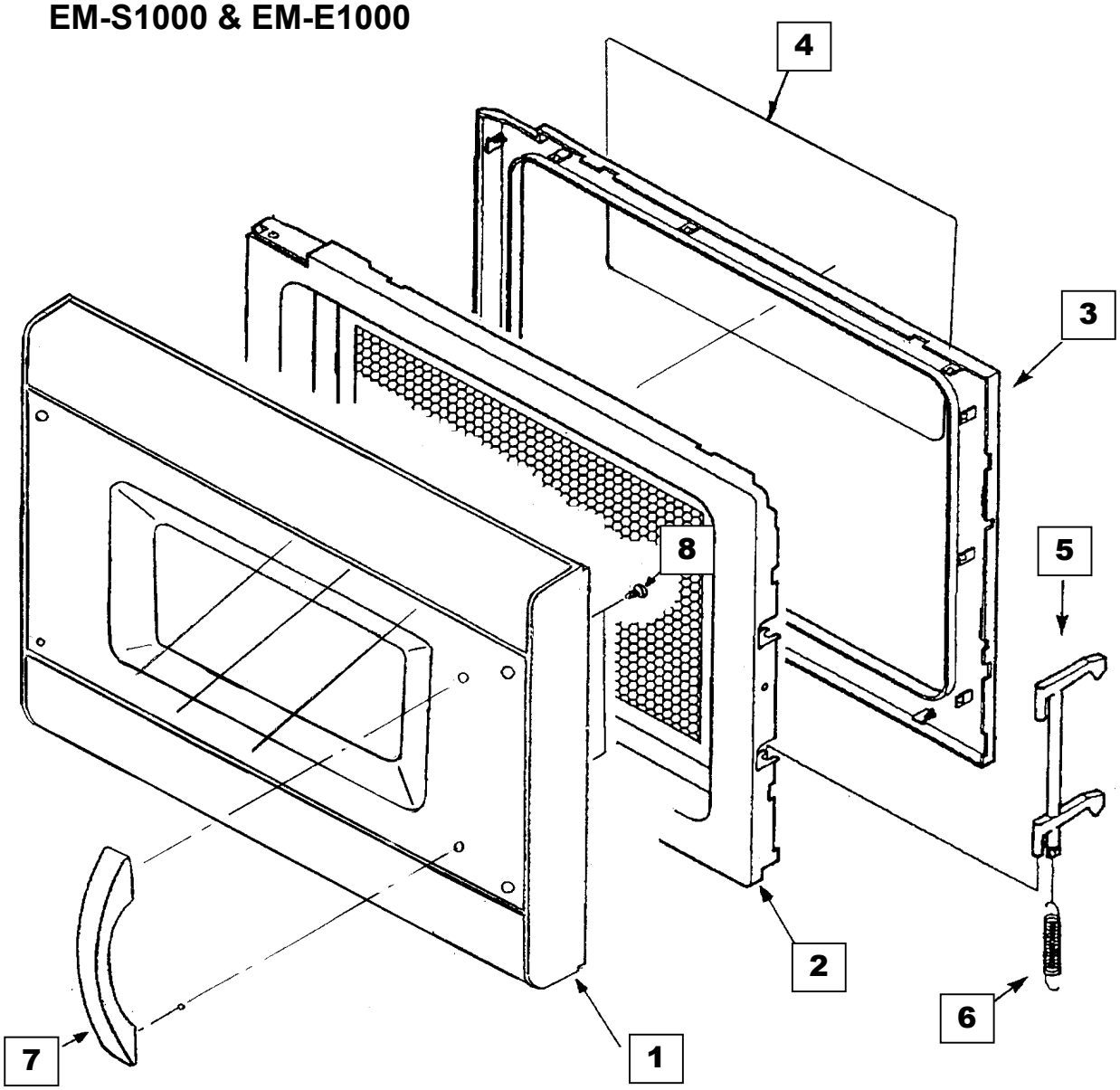


EM-S1000 & EM-E1000

MICROWAVE PARTS



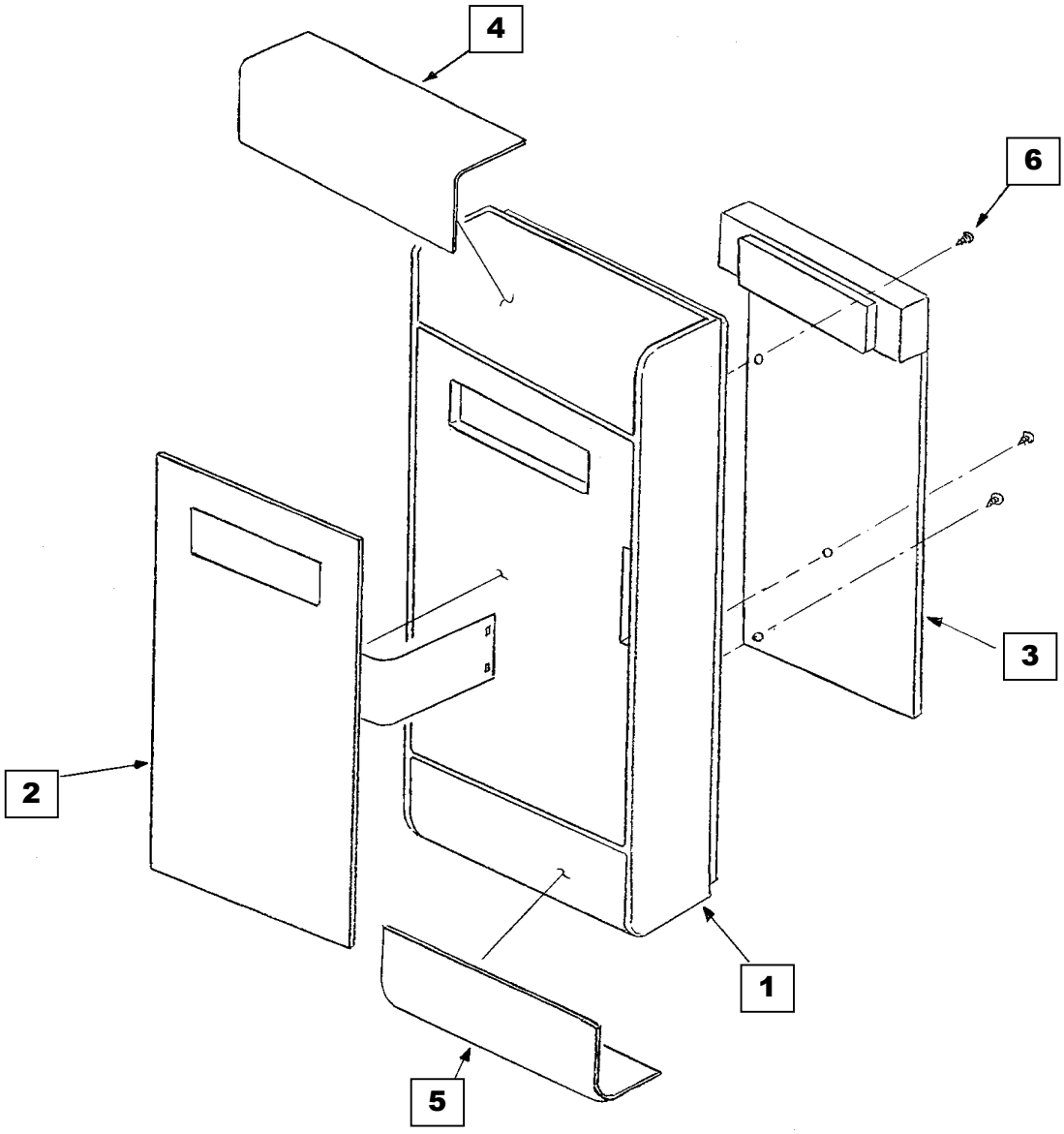
EM-S1000 & EM-E1000



This illustration for reference only. Door Assembly must be replaced. □
No individual parts are available except items 1, 3, 7 and 8.

EM-S1000 & EM-E1000

CONTROL PANEL PARTS



Parts List for EM-S1000

Page	No.	Service Code	Name	Qty	Factory Code No.
P11	1	MO-M1206	Body	1	MO-M1206
P11	2	JT1T4x8	Screw	5	JT1T4x8
P11	3	MO-A0760	Cavity Assy	1	MO-A0760
P11	4	MO-R0790	Cover (R)	1	MO-R0790
P11	5	MO-R0791	Cover (L)	1	MO-R0791
P11	6	MO-E0240	Mica Plate	1	MO-E0240
P11	7	MO-S0075K	Rivet	6	MO-S0075K
P11	8	MO-S1137	Gear Motor [T/T motor]	1	MO-S1137
P11	9	4x8 PCTC	Screw	2	4x8 PCTC
P11	10	MO-S0795K187	Oven Thermostat	1	MO-S0795K187
P11	11	3x6 PSTC	Screw	4	3x6 PSTC
P11	12	432-0-2210-06200-A	Stirrer Assy	1	432-0-2210-06200-A
P11	13	MO-E0231	Shelf Assy	1	MO-E0231
P11	14	4x8DC1TN	Screw	2	4x8DC1TN
P13	1	MO-G1854	Power Supply Cord	1	MO-G1854
P13	2	4x8 TSTC/S	Screw	5	4x8 TSTC/S
P13	3	MO-S0795K187	M.G.T Thermostat	1	MO-S0795K187
P13	4	MO-E0081	Thermo Sheet	2	MO-E0081
P13	5	3x6 PSTC	Screw	4	3x6 PSTC
P13	6	MO-M1044	M.G.T. Guide	1	MO-M1044
P13	7	MO-S0688	Noise Filter	1	MO-S0688
P13	8	MO-S0555	Fuse 250V 10A	1	MO-S0555
P13	9	MO-R0439	Fan Casing	1	MO-R0439
P13	10	MO-M0993	Capacitor Holder	1	MO-M0993
P13	11	MO-S0856	Capacitor	1	MO-S0856
P13	12	MO-S0954	Diode	1	MO-S0954
P13	13	MO-S0603	Motor Complete [Fan Motor]	1	MO-S0603
P13	14	MO-R0235N	Fan	1	MO-R0235N
P13	15	MO-S1126	Magnetron	1	MO-S1126
P13	16	4x8 HCTC	Screw	4	4x8 HCTC
P13	17	MO-R0471	Air Guide	1	MO-R0471
P13	18	MO-S0557A	Lamp 240V 20W	1	MO-S0557A
P13	19	MO-R0625S	Switch Bracket	1	MO-R0625S
P13	20	MO-R0653	Switch Lever	1	MO-R0653
P13	21	MO-S1109	Primary Interlock Switch	1	MO-S1109
P13	22	MO-S1110	Interlock Monitor Switch	1	MO-S1110
P13	23	MO-S1109	Door Switch	1	MO-S1109
P13	24	4x8 TB1TN/C	Screw	2	4x8 TB1TN/C
P13	25	4x8 TC1TC	Screw	8	4x8 TC1TC
P14	1	MO-S1140	Transformer	1	MO-S1140
P14	2	5x10 HCTC	Screw	2	5x10 HCTC
P14	3	MO-M1063	Bottom Plate	1	MO-M1063
P14	4	MO-R0546	Foot (R)	2	MO-R0546
P14	5	MO-R0765	Foot (F)	2	MO-R0765
P14	6	4x8 TSTC/B	Screw	4	4x8 TSTC/B
P14	7	MO-S1138	Cement Resistor	1	MO-S1138
P14	8	4 x 8 TCITC	Screw	1	4 x 8 TCITC
P15	1	MO-A0795	Door Assy	1	MO-A0795
P15	2	MO-A0499	Door Main Frame Assy	1	MO-A0499
P15	3	MO-R0606	Choke Cover	1	MO-R0606
P15	4	MO-E0179	Door Inner Film	1	MO-E0179
P15	5	MO-R0626	Door Hook	1	MO-R0626
P15	6	MO-M1018	Door Spring	1	MO-M1018
P15	7	MO-D2290	Handle	1	MO-D2290
P15	8	4X5 TRUSS B1	Tapping Screws	2	4X5 TRUSS B1
P16	1	MO-D2289	Control Plate [Switch Panel]	1	MO-D2289
P16	2	MO-S1119	Keyboard	1	MO-S1119
P16	3	MO-A0780	PCB Complete [PCB Main board]	1	MO-A0780
P16	4	MO-M1186	Decoration Plate D	1	MO-M1186
P16	5	MO-M1187	Decoration Plate E	1	MO-M1187
P16	6	3x8 BBTC	Screw	3	3x8 BBTC

Parts List for EM-E1000

Page	No.	Service Code	Name	Qty	Factory Code No.
P11	1	MO-M1207	Body	1	MO-M1207
P11	2	JT1T4x8	Screw	5	JT1T4x8
P11	3	MO-A0761	Cavity Assy	1	MO-A0761
P11	4	MO-R0790	Cover (R)	1	MO-R0790
P11	5	MO-R0791	Cover (L)	1	MO-R0791
P11	6	MO-E0241	Mica Plate	1	MO-E0241
P11	7	MO-S0075K	Rivet	6	MO-S0075K
P11	8	MO-S1028	Gear Motor [T/T motor]	1	MO-S1028
P11	9	4x8 PCTC	Screw	2	4x8 PCTC
P11	10	MO-S0795K187	Oven Thermostat	1	MO-S0795K187
P11	11	3x6 PSTC	Screw	4	3x6 PSTC
P11	12	MO-R0688	Coupling	1	MO-R0688
P11	13	MO-R0674	Rilling Arm	1	MO-R0674
P11	14	MO-R0689	Roller	3	MO-R0689
P11	15	MO-S0563	Shelf [Glass Tray]	1	MO-S0563
P11	16	MO-R0132	Special Washer [Thrust Washer]	1	MO-R0132
P13	1	MO-G1854	Power Supply Cord	1	MO-G1854
P13	2	4x8 TSTC/S	Screw	5	4x8 TSTC/S
P13	3	MO-S0795K187	M.G.T Thermostat	1	MO-S0795K187
P13	4	MO-E0081	Thermo Sheet	2	MO-E0081
P13	5	3x6 PSTC	Screw	4	3x6 PSTC
P13	6	MO-M1044	M.G.T. Guide	1	MO-M1044
P13	7	MO-S0688	Noise Filter	1	MO-S0688
P13	8	MO-S0555	Fuse 250V 10A	1	MO-S0555
P13	9	MO-R0439	Fan Casing	1	MO-R0439
P13	10	MO-M0993	Capacitor Holder	1	MO-M0993
P13	11	MO-S0856	Capacitor	1	MO-S0856
P13	12	MO-S0954	Diode	1	MO-S0954
P13	13	MO-S0603	Motor Complete [Fan Motor]	1	MO-S0603
P13	14	MO-R0235N	Fan	1	MO-R0235N
P13	15	MO-S1126	Magnetron	1	MO-S1126
P13	16	4x8 HCTC	Screw	4	4x8 HCTC
P13	17	MO-R0471	Air Guide	1	MO-R0471
P13	18	MO-S0557A	Lamp 240V 20W	1	MO-S0557A
P13	19	MO-R0625S	Switch Bracket	1	MO-R0625S
P13	20	MO-R0653	Switch Lever	1	MO-R0653
P13	21	MO-S1109	Primary Interlock Switch	1	MO-S1109
P13	22	MO-S1110	Interlock Monitor Switch	1	MO-S1110
P13	23	MO-S1109	Door Switch	1	MO-S1109
P13	24	4x8 TB1TN/C	Screw	2	4x8 TB1TN/C
P13	25	4x8 TC1TC	Screw	8	4x8 TC1TC
P14	1	MO-S1140	Transformer	1	MO-S1140
P14	2	5x10 HCTC	Screw	2	5x10 HCTC
P14	3	MO-M1063	Bottom Plate	1	MO-M1063
P14	4	MO-R0546	Foot (R)	2	MO-R0546
P14	5	MO-R0765	Foot (F)	2	MO-R0765
P14	6	4x8 TSTC/B	Screw	4	4x8 TSTC/B
P14	7	MO-S1138	Cement Resistor	1	MO-S1138
P14	8	4 x 8 TCITC	Screw	1	4 x 8 TCITC
P15	1	MO-A0795	Door Assy	1	MO-A0795
P15	2	MO-A0499	Door Main Frame Assy	1	MO-A0499
P15	3	MO-R0606	Choke Cover	1	MO-R0606
P15	4	MO-E0179	Door Inner Film	1	MO-E0179
P15	5	MO-R0626	Door Hook	1	MO-R0626
P15	6	MO-M1018	Door Spring	1	MO-M1018
P15	7	MO-D2290	Handle	1	MO-D2290
P15	8	4X5 TRUSS	Tapping Screws	2	4X5 TRUSS
P16	1	MO-D2289	Control Plate [Switch Panel]	1	MO-D2289
P16	2	MO-S1119	Keyboard	1	MO-S1119
P16	3	MO-A0780	PCB Complete [PCB Main board]	1	MO-A0780
P16	4	MO-M1186	Decoration Plate D	1	MO-M1186
P16	5	MO-M1187	Decoration Plate E	1	MO-M1187
P16	6	3x8 BBTC	Screw	3	3x8 BBTC